Computer programs that think like humans

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"Our programs are beating the conventional math programs because we are combining mathematics and psychology," said Claes Strannegard of the University of Gothenburg. Credit: University of Gothenburg

Intelligence – what does it really mean? In the 1800s, it meant that you were good at memorising things, and today intelligence is measured through IQ tests where the average score for humans is 100. Researchers at the Department of Philosophy, Linguistics and Theory of Science at the University of Gothenburg, Sweden, have created a computer program that can score 150.

IQ tests are based on two types of problems: progressive matrices, which

test the ability to see patterns in pictures, and number sequences, which test the ability to see patterns in numbers. The most common math computer programs score below 100 on IQ tests with number sequences. For Claes Strannegård, researcher at the Department of Philosophy, Linguistics and Theory of Science, this was a reason to try to design 'smarter' computer programs.

"We're trying to make programs that can discover the same types of patterns that humans can see," he says.

The research group, which consists of Claes Strannegård, Fredrik Engström, Rahim Nizamani and three students working on their degree projects, believes that number sequence problems are only partly a matter of mathematics – psychology is important too. Strannegård demonstrates this point:

"1, 2, …, what comes next? Most people would say 3, but it could also be a repeating sequence like 1, 2, 1 or a doubling sequence like 1, 2, 4. Neither of these alternatives is more mathematically correct than the others. What it comes down to is that most people have learned the 1-2-3 pattern."

The group is therefore using a psychological model of human patterns in their computer programs. They have integrated a mathematical model that models human-like problem solving. The program that solves progressive matrices scores IQ 100 and has the unique ability of being able to solve the problems without having access to any response alternatives. The group has improved the program that specialises in number sequences to the point where it is now able to ace the tests, implying an IQ of at least 150.

"Our programs are beating the conventional math programs because we are combining mathematics and psychology. Our method can potentially

be used to identify patterns in any data with a psychological component, such as financial data. But it is not as good at finding patterns in more science-type data, such as weather data, since then the human psyche is not involved," says Strannegård.

The research group has recently started collaborating with the Department of Psychology at Stockholm University, with a goal to develop new IQ tests with different levels of difficulty.

"We have developed a pretty good understanding of how the tests work. Now we want to divide them into different levels of difficulty and design new types of tests, which we can then use to design computer programs for people who want to practice their problem solving ability," says Strannegård.

Provided by University of Gothenburg

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